A CONTRIBUTION TO THE KNOWLEDGE OF THE TREMATODE PARASITES OF THE FOOD MAMMALS OF RANGOON

BY

G. D. BHALERAO, M.Sc.

(*Biological Department, University of Rangoon*)

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INTRODUCTION

The present paper is the outcome of an examination of the Trematodes found in the bullocks, cows, buffaloes, goats, sheep, and pigs slaughtered at the municipal abattoirs, Rangoon. *Fasciola gigantica*, Cobbold, 1858, was found only in bullocks, cows, and buffaloes, always in the liver, and in large numbers. Thus the infection in buffaloes is sometimes 10 per cent., and in bullocks and cows 4 per cent. and 2 per cent. respectively. *Paramphistomum cervi* (Zeder, 1790) and *Eurytrema dajii*, n.sp. sometimes accompany *F. gigantica* in the bile ducts of *Bos indicus*. In goats and sheep the infection is very small, amounting in some months to only 2 per cent. This infection, as reported by the municipal officials, is due to *Fasciola hepatica* L. 1758. No opportunity presented itself of examining these parasites, all the goats and sheep proving to be non-infected whenever a visit was paid to the slaughter-house. Two varieties of pigs are killed in Rangoon, one from Burma, the

other imported from the east coast of India, the latter of these being specially rich in Trematodes. Two species occur in their intestines, *Fasciolopsis fülleborni*i, Rodenwaldt, 1909, and *Testifrondosa cristata*, n.sp., the latter being rare.

It is my pleasant duty here to thank Professor F. J. Meggitt who helped me at almost every stage of my work and Mr. G. E. Gates of Judson College, who kindly allowed me the use of his preparations of *Testifrondosa cristata*.

PARAMPHISTOMUM CERVI (Zeda, 1790)

Numerous specimens of this species were found in the bile-ducts of *Bos indicus*, together with many *Fasciola gigantica*. The material confirmed in all respects the description already given by Maplestone (1923).

FASCIOLA GIGANTICA, Cobbold, 1858

Innumerable specimens of this species agreeing in all points with the ' Rangoon specimens ' of Jackson (1921) were found blocking the bile-ducts of *Bos indicus* and *Bos bubalis*. *F. aegyptica*, Looss 1896, appears to be identical with it.

F. HEPATICA, L. 1758

Specimens of this species are reported to have been found in the bile-ducts of sheep and goats, but no cases have been observed by me and no definite records exist.

FASCIOLOPSIS FÜLLEBORNII, Rodenwaldt, 1909 (Plate VI)

Many specimens of this species were found in the intestines of pigs (*Sus cristatus*, Wag., 1900) killed at the slaughter-house, Kemmendine, Rangoon. Apparently they are not firmly attached to the walls of the intestine, as numbers of them quickly emerge when it is washed. The specimens ranged from very immature forms (5·5 mm. by 2·2 mm.) to large ones (55 mm. by 16 mm.), both measured living and fully extended in luke-warm water. These specimens undergo very great contraction when placed in a fixing fluid and become very thick. The immature forms are

rather elliptical, with their greatest width at the level of the anterior testis and with no indication of a cephalic cone at their anterior ends.

The mature forms appear to be tongue-shaped when completely extended and at their anterior end a short cephalic cone can be made out, the posterior end being bluntly rounded. The greatest width is attained at the level of the anterior testis. The cuticle is thick and smooth without either spines or scales.

At the end of the cephalic cone in the fully developed forms is a small circular mouth, surrounded by an oral sucker also circular and measuring from 270μ to 700μ in diameter. At a distance of almost 300μ behind the oral sucker is a large ventral sucker (700μ in diameter and from 1·54 to 2·8 mm. in length) produced posteriorly into a sac-like prolongation. The ratio between the oral and the ventral sucker is 1 : 3·2 to 1 : 3·4. Immediately following upon the oral sucker is a prepharyngeal sphincter behind which is a globular pharynx 240μ to 670μ in diameter. There is no oesophagus. The intestinal caeca appear to arise from the pharynx and pass posteriorly almost to the hinder end of the body in a zigzag manner with two characteristic curves, one in front of the anterior testis between it and the ovary and another between the testes. The thickness is uniform throughout.

The genital pore is immediately anterior to the ventral sucker. The cirrus sac is very characteristic. It is not a cylindrical straight pouch as in other species, but is peculiarly convoluted. It extends from between the shell gland and ventral sucker and passes anteriorly, touching the right border of the latter organ. In a well-grown specimen its width is 700μ and its length 8·5 mm. The posterior end is at the posterior two-thirds or more of the distance between the shell gland and the hinder border of the ventral sucker, the exact distance depending on its degree of convolution which is more pronounced in adults. In immature forms where the sac is nearly a cylindrical tube, its posterior end almost approaches the shell gland. The testes are the most prominent organs in the body, occupying nearly half its total area, lying one behind the other, and extending posteriorly from the shell gland. They are separated from the posterior border and the sides by the vitellaria. They are very much branched, each with four main branches, two diverging anteriorly and two posteriorly from a central point. In a fully

grown and well extended specimen the anterior testis measures 9 mm. antero-posteriorly and 12·5 mm. laterally, the posterior, 8·5 mm. antero-posteriorly and 12 mm. laterally. In no case, mature or immature, was the anterior testis found to be smaller than the posterior as Rodenwaldt (1909) has stated. The vas efferens from the posterior testis arises from the centre and passes anteriorly under the anterior testis, after which it turns towards the right to pass on the same side of the shell gland. In front of this it curves towards the centre, to meet a little behind the cirrus sac with the corresponding vas efferens from the anterior testis coming from the left side of the shell gland. The vas deferens so formed continues anteriorly for a short distance, then enters the cirrus sac, inside which it immediately swells into a seminal vesicle. This is continued anteriorly in a peculiarly convoluted course to the middle of the ventral sucker, where it is surrounded by the pars prostatica, then as the cirrus, finally opens by the male pore into the genital sinus.

The ovary is small and very much branched, measuring 230μ by 190μ in immature specimens and 2·85 mm. by 1·6 mm. in the fully mature forms. It lies to the right side of the body in front of the anterior testis, between it and the uterine coils. This position is liable to very interesting variations. In immature forms the ovary lies almost exactly in the middle of the body, but as the posterior half increases in size faster than the anterior, its centre moves more and more anteriorly as growth proceeds, until at last, in the fully developed specimens, it comes to lie in the anterior two-fifths of the body. From its inner side a short oviduct passes into the shell gland which, in the immature specimens, is somewhat oval measuring 240μ by 290μ, and in the mature forms almond-shaped, measuring 2·5 mm. by 1·55 mm. It lies in the centre in front of the anterior testis, always in the same position with regard to the ovary. On the ventral side is a spherical receptaculum seminis, measuring in fully developed specimens 650μ in diameter. In the immature forms no such organ is developed. Laurer's canal is short and opens on the dorsal side. The uterus becomes visible at the shell gland. From thence it passes to the left and again to the right, thus describing several loops between the shell gland and the ventral sucker. As the vagina, it is continued anteriorly by the side of the cirrus sac and dorsally to the ventral sucker to open into the genital sinus

through the female pore to the left of the male aperture. In some of the sectioned specimens, the greater part of the uterus was observed to be filled with spermatozoa. The vitelline glands are well developed and occupy a large area. They extend as lateral bands from the ventral sucker to the posterior end of the body, where both unite in the middle line behind the posterior testis. They consist of numerous round follicles each composed of several small acini. The stout transverse vitelline ducts (140μ in thickness) pass in front of the anterior testis and join in the middle line to form a common duct which opens into a yolk reservoir (1·78 mm. by 1·17 mm.) dorsal to the shell gland. The eggs are oval, thin-shelled and measure from 140μ to 162μ in length, and from 85μ to 95μ in breadth.

The description of the adult forms collected agrees with that given by Rodenwaldt (1909) in all respects, except that the anterior testis is larger than the posterior, whereas in specimens described by Rodenwaldt the contrary was the case. This discrepancy is probably due to the amount of contraction undergone by Rodenwaldt's specimens in the process of fixation. Further, his description was based upon only two specimens. More extensive material would possibly have caused a revision of his results with regard to this point. There are, in addition, slight differences of dimensions, but this point cannot be regarded as important, dependent as it is on the age and state of contraction of the worms.

TESTIFRONDOSA CRISTATA, n.g., n.sp. (Plate VII)

About three dozen specimens were found on one occasion in the intestine of *Sus cristatus*. The body of the worm is flat, with almost parallel sides which taper anteriorly, and it is covered with a thick cuticle. At the posterior end is a notch, above which is the excretory pore. The anterior part of the body from the level of the ventral sucker is thickly covered with backwardly directed scales which become more sparse posteriorly until they disappear completely at the level of the anterior testis. The length of the mature worms varies from 6 to 8 mm., the last being specimens extended under a little pressure. In breadth they vary from 2·5 to 3·5 mm., the greatest breadth being attained at the level of the posterior testis.

The circular mouth at the anterior end is surrounded by an oral sucker, 220μ in diameter. The ventral sucker is much larger than the oral and is drawn out posteriorly into a sac-like prolongation. It is 1·02 mm. long by 0·82 mm. in diameter, the excess of the length over the breadth being due to the sac-like prolongation posteriorly. The ratio between the oral and the ventral sucker is nearly 1 : 4. The usual position of the ventral sucker is with its centre approximately at the anterior fifth of the body.

The prepharynx is small, just behind the oral sucker. No pharyngeal glands were observed. The pharynx is globular with thick muscular walls and a diameter of 180μ. It is followed by an oesophagus 230μ in length. The intestinal caeca are unbranched and reach almost to the posterior end of the body. Each caecum is not uniform throughout, but narrower near the fork and slightly broader posteriorly.

The excretory vesicle is small and pear-shaped and opens behind by a pore on the dorsal side, a little in front of the notch at the posterior end. It extends anteriorly only for a short distance, and into it open several excretory ducts.

The testes lie centrally in the posterior half of the body one behind the other and are enclosed laterally and posteriorly by the vitellaria. They are the most conspicuous of all the organs in the body and occupy little more than one-fourth of its total length. Their most striking peculiarity is their branched appearance, the anterior one being in the form of a horizontal and the posterior approximately in the form of a vertical cross with the anterior limb slightly lateral. All limbs of the cross are branched irregularly. This branching constitutes the distinguishing characteristic of the genus. The dimensions of the anterior testis are 1·43 by 1·13 mm., and those of the posterior 1·31 by 1·18 mm. The vasa efferentia arise from the centre of the anterior end of each testis, and, after a zigzag course, unite to form a vas deferens opening at the base of the seminal vesicle. This latter is an elongated sac lying at the end of the cirrus sac and occupying the last quarter of its length ; it is continued as a convoluted tube filling three-fourths of the length of the cirrus sac and finally opens into a coiled ductus ejaculatorius ending in a short muscular cirrus. No ductus hermaphroditicus was noticed. Surrounding the cirrus and the ductus ejaculatorius, and

opening into them, are the prostatic glands. The cirrus sac is very much elongated and extends from the intestinal fork to some distance behind the ventral sucker. Its anterior fourth, which lies between the intestinal fork and the ventral sucker, is swollen, as is also the posterior fourth behind the ventral sucker. The middle portion is thinner. The position of the cirrus sac varies according to the state of contraction of the body. Normally it lies dorsal to the ventral sucker, but not infrequently it occurs sometimes to the right and sometimes to the left. The genital pore is central immediately behind the intestinal fork.

The ovary is approximately oval. It is situated on the ventral surface a little to the left of the middle line, between the posterior end of the cirrus sac and the anterior testis. The oviduct is small and runs centrally to the large shell gland, situated between the anterior testis and the ovary. Laurer's canal lies horizontally between the shell-gland and the anterior testis. The receptaculum seminis is ventral, almost in the centre of the body at the level of the ovary ; in entire mounts it is obscured by the shell gland. The vitellaria are lateral and numerous, extending from about half the length of the ventral sucker to the end of the body and occupying nearly two-thirds of the entire length. They consist of numerous small round follicles, each composed of a few acini. They are very narrow anteriorly, but become broader and broader posteriorly until, at a little distance behind the posterior testis, they meet in the middle line. Anteriorly they are marginal to the intestinal caeca, but posteriorly they overlap them. Nearly one-fifth of the posterior portion of the body is filled with these glands. Vitelline ducts arise at the level of the shell gland and open in the centre into a yolk reservoir communicating with the oviduct. Beyond this junction the oviduct is continued as the uterus which, describing six or seven turns between the shell gland and the ventral sucker, continues dorsally as a vagina lined with a thick cuticle. It finally opens into the genital pore by the side of the male genital aperture. The eggs are large, oval and operculated, from 110μ to 130μ long by 70μ to 80μ broad.

In the branched nature of the testes, the extent and form of the vitellaria, and the possession of a pouch to the ventral sucker, the present form resembles the genus *Fasciolopsis*, but differs from it

in the possession of a receptaculum seminis, and in the extent and position of the cirrus sac. It agrees in all important particulars with the description of the sub-family *Psilostominae*, Lühe, 1909, but differs in the branched nature of the testes: the genus *Psilochasmus*, Lühe, 1909, however, has somewhat deeply lobed testes. As the present form differs in important characters from any existing genus, it is necessary to create a new one for its reception. For this I propose the name *Testifrondosa*, and for the species *T. cristata*.

Testifrondosa (n.g.)

Diagnosis :—

Psilostominae : Body covered with scales. Oral sucker smaller than the ventral, latter drawn out posteriorly into a sac-like prolongation. Prepharynx small, pharynx small, globular. Oesophagus short. Intestinal caeca nearly reaching posterior end of the body. Genital pore near intestinal fork. Cirrus sac much elongated, extending beyond ventral sucker and containing vesicula seminalis. Pars prostatica and Laurer's canal present. Testes branched, in posterior half of the body, one behind the other. Shell gland central. Ovary anterior to testes. Receptaculum seminis present. Vitellaria lateral, meeting in the middle line posterior to testes. Uterine coils between shell of gland and cirrus sac. Excretory canal pear-shaped. Eggs large, operculated.

Host : *Sus cristatus* (Wagner, 1909).

Type Species : *Testifrondosa cristata*, n.sp.

***EURYTREMA DAJII*, n. sp. (Plate VIII)**

From thirty to forty specimens of this species were collected in the bile-ducts of a *Bos indicus* also infested with *Paramphistomum cervi* and *Fasciola gigantica*. They were 5 to 6·7 mm. long by 3·5 to 4 mm. broad, and 6·32 mm. thick, coloured red and very sluggish. All were mature. They appeared to be roundish in their natural habitat, but when put in luke-warm water became leaf-like and flattened dorso-ventrally. The body was transparent, so that upon applying a little pressure in the living condition, the whole anatomy could be made out under a low magnification. The body is covered with a thin cuticle, bearing small square scales 20μ to 50μ, very thinly distributed and absent from the edges. The maximum

breadth is reached at the level of the ovary or a little behind it, thence the body narrows towards the anterior extremity, ending, however, rather bluntly owing to the presence of the oral sucker. Above this the margin of the body projects in the shape of a thick lip. At the posterior end is a conspicuous tongue-like appendage—the caudal appendage. A little behind the anterior extremity is a circular mouth surrounded by an oral sucker which, in most cases, is round, but sometimes has its antero-posterior diameter slightly the bigger. On an average the oral sucker is 750μ in diameter. The ventral sucker lies in the anterior half of the body : its size in some cases is equal to, and in others slightly larger than that of the oral sucker, the greater diameter being on the average 850μ. The ratio between the two suckers is 1 : 1·3 ; the distance between their centres is a little more than one-third the total length of the whole body. The pharynx is small, 250μ by 220μ and lies immediately behind the oral sucker. Following it is a very short oesophagus approximately 50μ long. This immediately bifurcates into two intestinal caeca which diverge and pass along the sides of the body in a sinuous course that becomes specially accentuated behind the testis. Their blind ends terminate a little in front of the caudal appendage, about 800μ from the posterior end of the worm. The excretory pore is at the extreme posterior end, on the top of the caudal appendage. It leads in to an excretory vesicle which becomes bigger as it passes anteriorly and divides into two branches at about half-way between the posterior border of the ventral sucker and the hinder end of the body. These branches pass slightly anteriorly to each side and cross over the intestinal caeca. At the level of the ovary each divides again into anterior and posterior branches which can be traced almost to the ends of the body.

The genital pore is a little behind the intestinal fork, nearer the oral than the ventral sucker. The cirrus sac is elongated, much wider anteriorly and tapering behind, and extends from a little behind the intestinal fork to a little in front of the ventral sucker. It is inclined slightly to the left of the middle line. In a fully extended specimen it is 1 mm. long by 0·38 mm. broad, but the size varies greatly according to the degree of body contraction. The testes almost touch the intestinal caeca behind the ventral sucker. They measure 400μ to 560μ in length and 220μ to 350μ in breadth.

Their position varies greatly ; sometimes they are quite symmetrical, but not infrequently the right is a little in advance of the left or *vice versa*. The margin is lobed, sometimes deeply, sometimes slightly, the number of lobes being usually four. From the anterior lobe or from the lobe directed towards the ventral sucker of each testis, arises a vas efferens which runs inwardly towards its fellow on the other side and joins with it to form a vas deferens at the base of the cirrus sac. The vas deferens then passes into the cirrus sac where, after a short interval, it widens into a vesicula seminalis. The vesicula seminalis continues as a convoluted tube filling up nearly two-fifths of the posterior part of the cirrus sac, then, as a ductus ejaculatorius and finally as a muscular cirrus, opens into the genital sinus by the male aperture. The ductus ejaculatorius is surrounded by the pars prostatica.

The ovary is small, 220μ to 300μ by 170μ to 250μ. It lies in the posterior half of the body, a little to the left of the middle line and a short distance behind the testes. In a well extended form it appears to be trilobed, in others its shape varies, sometimes being oval, and sometimes elongated transversely. From its inner side a short duct passes into the shell gland, 200μ by 130μ, near the ovary. On the dorsal side and overlapping the ovary is a small round receptaculum seminis, 190μ by 160μ. Laurer's canal proceeds from the ovary anteriorly towards the ventral sucker, a little behind which it terminates. In a fully extended condition it is 300μ long by 30μ wide. Its most striking characteristic is the absence of an external pore. In living specimens its blind nature can be ascertained by the movements that it makes when subjected to slight change of pressure : even in sections no opening to the exterior could be discovered. In this respect the present species differs from all others of the same genus.

The uterus becomes visible after the shell gland. It first coils posteriorly, then passes anteriorly between the right testis and the ventral sucker to continue, still coiled, on the right side of the latter, where it joins a long, thin, muscular vagina. This passes lateral to the cirrus sac and opens by the female aperture on the anterior side of the genital atrium. The uterine coils are numerous and nearly overlap the intestinal caeca : anteriorly they are limited by the testes and the ventral sucker : posteriorly they may end at the

termination of the intestinal caeca, but more often project beyond them and occupy a portion of the caudal appendage. The uterine coils are not in well-defined loops but appear to be scattered branches. Sometimes, in a particular state of contraction, the descending and ascending parts of the uterus pass so near one another in the middle line, that the appearance is that of a central stem with many lateral branches.

The vitelline glands are not well developed. They consist of from ten to thirteen groups on each side, each composed of numerous slender acini. In fully extended specimens the groups lie one behind the other outside the intestinal caeca : they are sometimes round, but are liable to much variation in contracted specimens ; in these the linear arrangement of the groups is disturbed, so that they lie irregularly outside the intestinal caeca, occasionally with the follicles pushed below each caecum. The individual groups of follicles become sometimes so much stretched that the acini are arranged in irregular lines, usually commencing on the outer border of the testis and ending at about half-way between the posterior border of the ventral sucker and the base of the caudal appendage. Sometimes the glands on the same side as the ovary extend further anteriorly than those of the opposite side, and sometimes *vice versa*. Two smaller vitelline ducts, anterior and posterior, from each gland unite to form a transverse vitelline duct which, arising from the centre, passes internally to meet with its fellow from the other side and open into the shell gland. No yolk reservoir was noticed. The eggs are small, operculated, 32μ to 40μ long by 22μ to 27μ broad.

Up to the present, seven species of the genus *Eurytrema* have been described, one of them, *Eurytrema crucifer* (Nicoll, 1914), later being placed by Kossack (1910) in his new genus *Paradistomum*. The description of *Eurytrema parvum* (Senoo, 1907) is not accessible to me in India. From the table given below it may be seen that the present species is allied to *Eurytrema pancreaticum* (Janson, 1889) with which it agreees :

(i) in the possession of a caudal appendage ;
(ii) the position of the genital aperture ;
(iii) the extent and the number of groups of vitellaria, and
(iv) the nature and disposition of the uterus,

but differs

(i) in the possession of cuticular scales ;
(ii) the ventral sucker being slightly larger than the oral ;
(iii) the position of the cirrus sac, and
(iv) the blind nature of Laurer's canal.

These points seem to me of sufficient importance to justify the creation of a new species for which I propose the name *Eurytrema dajii*.

Specific Diagnosis.

Eurytrema : 5 to 6·7 mm. by 3·5 to 4 mm. Cuticle covered with scales. Caudal appendage well developed. Ventral sucker slightly larger than oral. Genital pore posterior to intestinal bifurcation. Cirrus sac not reaching anterior margin of ventral sucker. Vitellaria elongated, 10 to 13 groups, extending from testis to half the distance between ventral sucker and proximal end of caudal appendage. Laurer's canal with no external opening. Uterus passing anteriorly, lateral to ventral sucker : uterine coils asymmetrical, not crossing intestinal caeca.

Host : *Bos indicus* (bile ducts).

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A comparative Table of the species of the genus *Eurytrema*

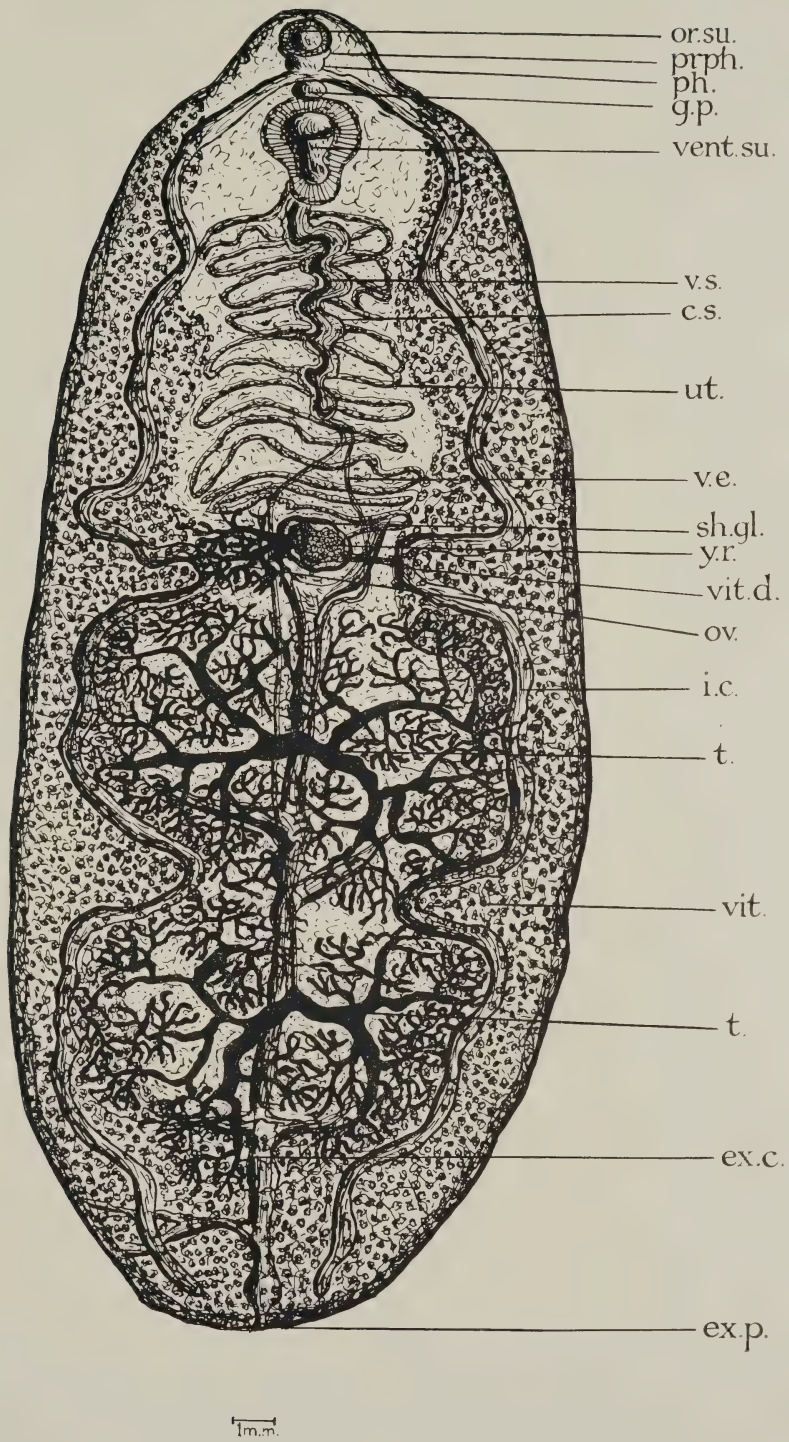
Species	*E. dajii*, n.sp.	*E. pancreaticum* (Janson, 1889)	*E. coelomaticum* (Giard and Billet, 1892)	*E. concinnum* (Braun, 1901)	*E. brumpti* (Railliet, Henry, and Joyeux, 1912)	*E. satoi* (Kobayashi, 1915)
Host	*Bos indicus*, bile ducts	Bovidae, pancreatic ducts	Bovidae, pancreatic ducts	*Vivera zibetha*, gall bladder	Chimpanzee, bile and pancreatic ducts	*Macacus cynomolgus*, pancreatic ducts
Size	5-6·7 by 3·5-4 mm.	13-14 by 6·5-7 mm.	7-10 by 4-5·5 mm.	2·7-3 by 1·6 mm.	3·5-4 by 1·8-2·3 mm.	6-6·5 by 2-3 mm.
Scales	Present	Absent	Absent	Absent	Very fine	Absent
Caudal appendages ...	Present	Present	Present	Absent	Absent	Less conspicuous
Size of suckers	Ventral slightly larger	Oral larger	Both equal	Ventral larger	Ventral larger	Ventral slightly larger
Genital pore	Behind bifurcation of intestine	Behind bifurcation of intestine	Behind bifurcation of intestine	Before bifurcation of intestine	Before bifurcation of intestine	Behind bifurcation of intestine
Cirrus sac	Not reaching anterior border of ventral sucker	Reaching anterior border of ventral sucker	Reaching anterior border of ventral sucker	Not reaching anterior border of ventral sucker	Not reaching anterior border of ventral sucker	Not reaching anterior border of ventral sucker
Vitellaria	Elongated, 10 to 13 groups, from testes to one half the distance between ventral sucker and caudal appendage	Elongated, 10 to 12 groups, from testes to one half the distance between ventral sucker and caudal appendage	Elongated, 6 to 8 groups posterior to testes	Round, 6 groups	Round, 11 to 14 groups behind ovary	Elongated, 3 to 4 groups behind ovary
Laurer's Canal	With no external pore	With external pore	With external pore	With external pore	With external pore	With external pore
Position of uterus ...	By the side of ventral sucker	By the side of ventral sucker	By the side of ventral sucker	Above ventral sucker	Above ventral sucker	By the side of ventral sucker
Uterine groups	Anterior uterine groups asymmetrical; do not cross over intestinal caeca	Anterior uterine groups asymmetrical; do not cross intestinal caeca	Anterior uterine groups asymmetrical; do not cross intestinal caeca.	Anterior uterine groups slightly asymmetrical; do not cross intestinal caeca	Anterior uterine groups asymmetrical; cross intestinal caeca	Cross intestinal caeca

Eurytrema parvium (Senoo, 1907) is not included in the above table.

EXPLANATION OF PLATE VI

Ventral view of *Fasciolopsis füllebornii*

c.s.	Cirrus sac.	*sh.gl.*	Shell gland.
ex.c.	Excretory canal.	*t.*	Testis.
ex.p.	Excretory pore	*ut.*	Uterus.
g.p.	Genital pore.	*v.s.*	Vesicula seminalis.
i.c.	Intestinal caecum.	*v.e.*	Vas efferens
or.su.	Oral sucker.	*vent.su.*	Ventral sucker.
Ov.	Ovary.	*vit.*	Vitellaria.
ph.	Pharynx.	*vit.d.*	Vitelline duct.
prph.	Prepharynx.	*y.r.*	Yolk reservoir.



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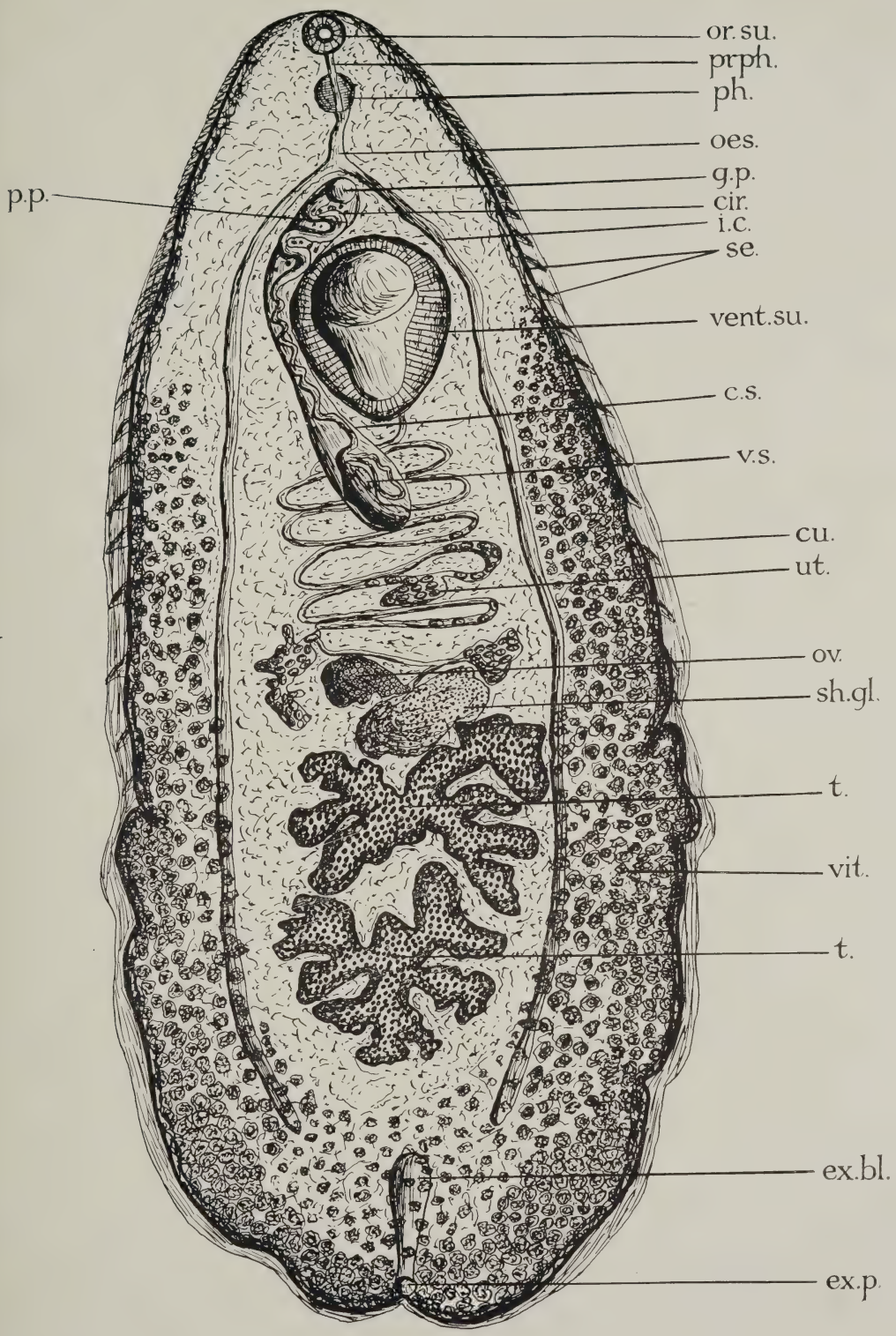
EXPLANATION OF PLATE VII

Dorsal view of *Testifrondosa cristata*.

c.s.	Cirrus sac.	*p.p.*	Pars prostatica.
cir.	Cirrus.	*prph.*	Prepharynx.
cu.	Cuticle.	*ph.*	Pharynx.
ex.bl.	Excretory bladder.	*sc.*	Scales.
ex.p.	Excretory pore.	*sh.gl.*	Shell gland.
g.p.	Genital pore.	*t.*	Testis.
i.c.	Intestinal caecum.	*ut.*	Uterus.
Oes.	Oesophagus.	*v.s.*	Vesicula seminalis.
or.su.	Oral sucker.	*vent. su.*	Ventral sucker.
ov.	Ovary.	*vit.*	Vitellaria.



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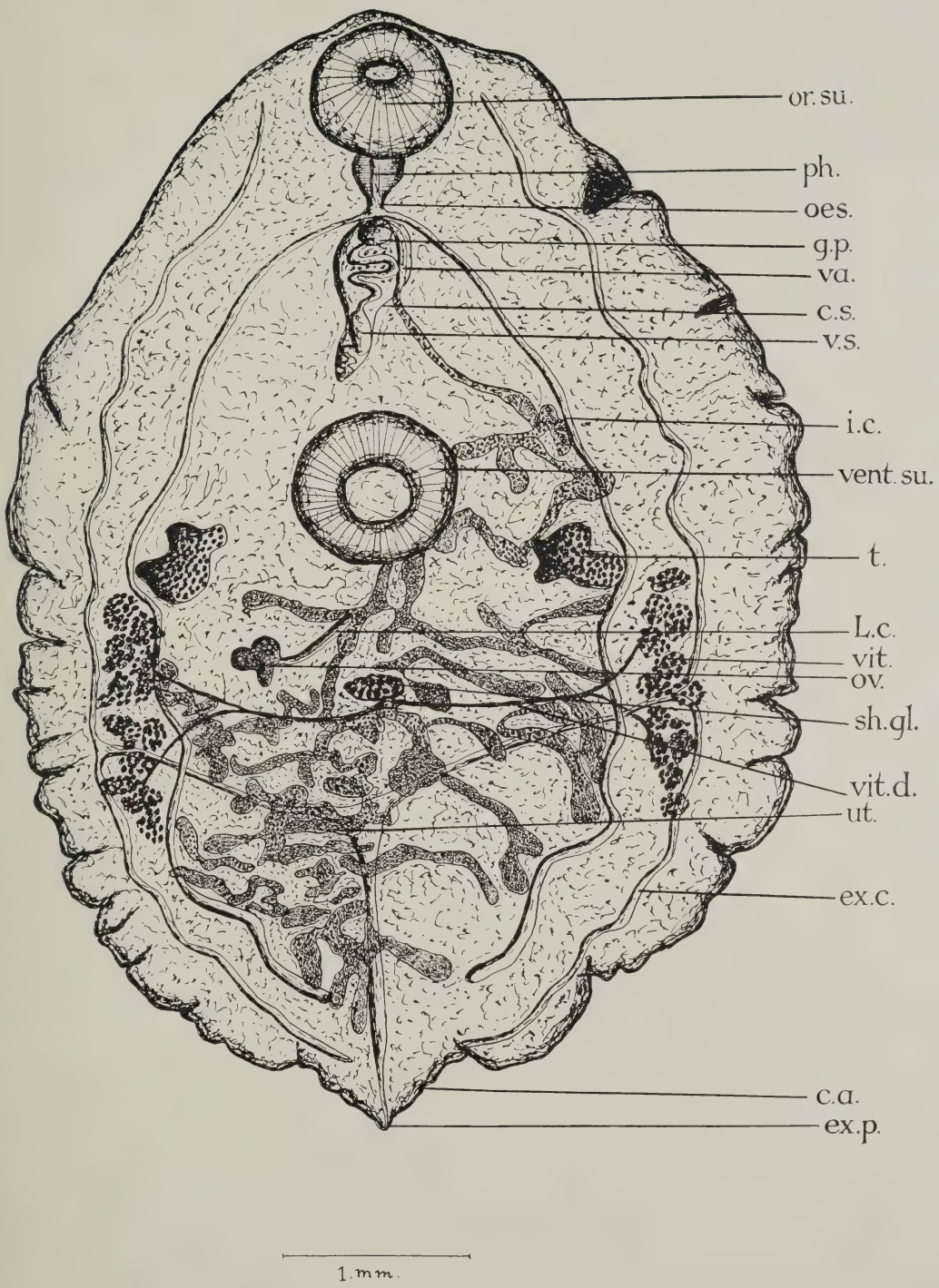
EXPLANATION OF PLATE VIII

Dorsal view of *Eurytrema dajii*.

c.s.	Cirrus sac.	*ov.*	Ovary.
c.a.	Caudal appendage.	*ph.*	Pharynx.
ex.c.	Excretory canal.	*sh.gl.*	Shell gland.
ex.p.	Excretory pore.	*ut.*	Uterus.
g.p.	Genital pore.	*v.s.*	Vesicula seminalis.
i.c.	Intestinal caecum.	*va.*	Vagina.
L.c.	Laurer's canal.	*vent.su.*	Ventral sucker.
oes.	Oesophagus.	*vit.*	Vitellaria.
or.su.	Oral sucker.	*vit.d.*	Vitelline duct.



C. Tinling & Co., Ltd., Imp.